Leisure Information Systems: The Purchasing Determinants of Video Game Consoles

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The international market for home video game consoles is substantial and competition between manufacturers is heated. As an information system, the popularity of this technology merits further study, yet there is a dearth of published research in the area. This paper discusses a study into the purchasing determinants of video game consoles. The study conducted focus groups and a literature search in order to develop a research model based on the Theory of Planned Behaviour. This research model was operationalised in a questionnaire survey of 210 adolescents. Analysis was conducted on the basis of level of adoption and gender.

The analysis revealed that family and friends had a significant effect on the decision to purchase a game console. In contrast to much prior IS research, the ability to pirate console software was significant for adopters, but not non-adopters, nor between genders. Cost was not a significant adoption factor, however the console's image had an effect in the analysis of gender.

(Console; Computer Games; Purchasing Determinants)

Introduction

The home video game console industry is one of the most financially successful forms of interactive entertainment in the world (Adams 2003). Worldwide, video game hardware and software sales amount to over US$15 billion in 2003, which is expected to increase by 44% by 2009 (DFC Intelligence Report 2004). The Entertainment Software Association notes that some 75% of households play computer games (ESA 2005), with 35% of parents in the United States active computer game players. The three dominant competitors in the market, Sony, Microsoft, and Nintendo, are in heated competition to capture a larger consumer base for their game console systems. Sony, Microsoft and Nintendo are all working on new consoles: specifications for these systems, such as technological capabilities, backward compatibility, and extra features have not been

confirmed, but it is expected that online gameplay and additional functionality will play a larger role in the future of these consoles (Baker 2004, Becker 2004).

As an information system, the phenomenal success of the console invites deeper exploration. As with many consumer products, it is likely that console manufacturers have already conducted extensive market research (Gallagher and Park 2002) yet, in the interests of retaining market share, it is unlikely that this information will be released to the research community. Of the scholarly avenues available to the researcher to study this phenomenon, the analysis of consumer attitudes is considered especially interesting. In the same way that organisations are explored in cases of commercial information systems, so the consumer is an appropriate unit of analysis for household technology (Stern et al. 2004). Dee (2003) wrote,

> *"Has there ever been a cultural sea change as stealthy as the one represented by the rise of interactive entertainment? To anyone who came of age after, say, the introduction of the first Sony PlayStation in 1995, video gaming is every bit as central to the pop-entertainment universe as movies or music. No one would think of denying that video games are big, but few grown-ups outside the business have an understanding of just how big they've become."*

There are several reasons why this study would benefit researchers in the areas of IS, innovation diffusion, and consumer behaviour. First, there is little published research on the topic of computer games in the information systems literature. Whereas much extant literature focuses on organisational IT, traditionally used to enhance productivity and work practices (Hsu and Lu 2004), consoles are used primarily as entertainment and leisure systems. This study applies a decomposed model of the theory of planned behaviour, a widely used theory of human behaviour, to study video game console adoption. This theory has previously been applied in the consumer technology adoption literature (Taylor and Todd 1995b, Choi et al. 2003, Teo and Pok 2003), however more empirical research is required to explore model generalisability (Taylor and Todd 1995b). The perspectives offered by applying a behavioural model may elicit previously unconsidered underlying adoption factors. Similarly, considering the adoption of a new system type may inform the innovation literature of previously unconsidered factors.

Second, the video game industry is now focusing on catering to female gamers, who were once thought to be a small niche market (DePasquale 2001) but who now constitute 43% of U.S. video game players (ESA 2005). The stereotypical video gamer is portrayed as a young male (Adams 2003, King and Borland 2003). This stereotype has persisted for many reasons. One is that the majority of the top-selling video games are designed to appeal to the male population (Adams 2003). Another is

the fact that game developers themselves are predominantly male, creating games for a male audience (Gailey 1993, Adams 2003). Female gamers appear to have different video gaming preferences to males (DePasquale 2001, Adams 2003, Agosto 2004), and they may also display differences in video game console preferences. Given the lack of literature on gender and console uptake (Brown et al. 1997), this research will also investigate possible differences in gender views regarding video game console adoption.

Some policy makers, such as the United States Senate, the Entertainment Software Association, and the National Institute on Media and the Family have expressed concern regarding possible negative effects of video gaming (Anderson and Bushman 2001, Takahashi 2004, Tamborini et al. 2004). Much of the research into related issues such as aggressive thoughts in children and adults, physiological arousal, desensitization to violence, and video game addiction has delivered mixed findings (Dill and Dill 1998, Deitz 1998, Anderson and Bushman 2001). Additionally, because game firms are less likely to divulge consumer research findings, policy makers must rely on their own market analyses for age, gender, and market penetration as necessary (Williams 2002). This provides a valuable opportunity for IS researchers, as they are well placed to provide analytical direction in this regard. As such, this paper comes in the tradition of Hsu and Lu (2004).

Given the popularity of these systems, the substantial resources and controversy involved, this study proposes the following research questions:

1) Which factors influence video game console adoption?

2) Does gender influence video game console adoption? If so, how?

3) Are the factors that influence video game adoption different for previous adopters and non-adopters of an older video game console?

The rest of this paper is structured as follows. The next section introduces the theory of planned behaviour as the theoretical basis for this study, and reviews the extant video game market literature in order to identify the factors influencing video game console purchases. The research model and hypotheses are then presented. This is followed by a discussion of the first phase of the research method, involving focus groups to qualitatively explore the game console phenomenon. The next section discusses the second phase of the research, using a survey to explore the phenomenon in greater depth. The analysis and results are then presented, followed by discussion and conclusions.

Theoretical Development

The typical video game console is used in conjunction with a television set. Software is purchased separately from the console, in a variety of media formats (such as cartridges, CDs and DVDs). This software is typically proprietary, and will work on one console type only (with the exception of backward compatible consoles). No software installation is required and the program begins to run immediately. Consoles come with at least one handheld input controller, which consists of an assortment of buttons, joysticks, thumbpads or triggers for the user to control the gameplay. In addition, some consoles now facilitate online game play (after the purchase of accessories) with demand for online gameplay expected to increase significantly in the future (Baker 2004).

The theory of planned behaviour (TPB) was chosen as the guiding framework for studying the adoption of video game consoles. The TPB has been applied to explain human behaviour in a variety of fields (see Ajzen 1991 and Madden et al. 1992 for reviews) including technology adoption (Mathieson 1991, Taylor and Todd 1995a) and technology use by consumers (Taylor and Todd 1995b, Choi et al. 2003, Teo and Pok 2003). The addition of the perceived behavioural control construct makes the TPB particularly suited to explaining volitional behaviours that are constrained by resources and opportunities (Ajzen and Madden 1985, Ajzen 1991, Taylor and Todd 1995b).

According to the TPB, intention and perceived behavioural control are the immediate antecedents of behaviour: it is assumed that when an individual's intention is high and they have some degree of actual control over the behaviour, they will pursue that behaviour when the opportunity arises (Ajzen and Madden 1985, Ajzen 1991).

In a decomposed TPB model, introduced by Taylor and Todd (1995a, 1995b), attitudinal, normative, and control beliefs are decomposed into specific belief dimensions. Previous research has found that it is unlikely that monolithic belief structures (such as in TRA and TPB) representing a variety of dimensions will be consistently related to the antecedents of intention (Bagozzi 1981, Shimp and Kavas 1984). By decomposing these belief structures, the relationship between the antecedents of intention and intention itself should become clearer. The decomposed approach overcomes operationalisation problems present in other traditional intention models (Mathieson 1991, Berger 1993). Further, by focusing on specific beliefs, the model is able to suggest more practical implications for video game console firms, pointing to specific factors that may influence adoption (Taylor and Todd 1995a).

Video Game Consoles in the Context of the Theory of Planned Behaviour

This section details the decomposed constructs of *attitude*, *subjective norm* and *perceived behavioural control* which may influence the consumer in the decision to adopt a video game console.

Attitude

The identification of a stable set of relevant dimensions for attitudinal beliefs has been problematic for TPB researchers (Berger 1993), because the belief measures used for the TPB are based on belief elicitation measures which relate to specific settings (Ajzen 1991). Under such conditions, the belief structure may reflect a variety of underlying dimensions which obscure its relationship to attitude, leading to less than ideal measures of attitudinal belief (Taylor and Todd 1995a). Therefore, following in the footsteps of Taylor and Todd (1995a, 1995b), the majority of the attitudinal belief dimensions to be used in the research model are derived from Moore and Benbasat's (1991) perceived characteristics of innovating.

Relative Advantage

Relative advantage refers to the degree to which an innovative product is perceived to be superior to those that preceded it (Ostlund 1974, Holak and Lehmann 1990, Rogers 1995). It is comparable to Davis' perceived usefulness construct in the technology acceptance model (Davis 1989, Moore and Benbasat 1991). The construct has been an important predictor of technology adoption in prior IS work (Tornatzky and Klein 1982, Moore and Benbasat 1991) and in studies of consumer technology acceptance (Rogers 1983, Holak and Lehmann 1990, Taylor and Todd 1995b, Teo and Pok 2003).

Due to the lack of IS research in the field of video gaming, the relative advantage conveyed by a video game console to consumers remains unclear. Rogers (1995) stated that the degree of relative advantage is often expressed in terms of economic profitability, social prestige, or other benefits, depending on the innovation and the characteristics of the potential adopters.

The first aspect of relative advantage is technical superiority. Literature regarding the appeal of technological superiority to consumers is mixed: some studies of the video game industry have shown that, in order to succeed, a console must be more than just a superior technological innovation (Gallagher and Park 2002, Schilling 2003). Technological superiority did not appear to be an important motivator towards adoption if the cost of the newer console was substantially higher than the older console (Gallagher and Park 2002). Thus, while technological superiority may be an important motivating factor for consumers, other factors (such as cost and the availability of

compelling software) could be of greater significance (Gallagher and Park 2002, Schilling 2003, Shankar and Bayus 2003, Clements and Ohashi 2004).

The availability of compelling software may positively affect the adoption decision. Alvisi et al. (2003:612) argue that "customers will choose the system on the basis of the kind of games they enjoy the most". Over the life of the video game industry, many video game consoles have failed due to a lack of compelling software titles. For example, the Phillips CD-i suffered (among other reasons) due to a lack of compelling games for American users (Trachtenberg 1996). The 3DO Interactive Multiplayer similarly suffered from a lack of quality game titles (Herman 1997, Gallagher and Park 2002). More successful video game consoles have featured "killer application" software titles whose appeal is strong enough to justify the purchase of the console (Alvisi et al. 2003), such as Atari's *Pong*, Nintendo's *Super Mario* series, Sega's *Sonic the Hedgehog*, Sony's *Grand Theft Auto* series and Microsoft's *Halo* (Evans et al. 2005).

Complexity

Complexity is defined by Rogers (1995) as the "*degree to which an innovation is perceived as difficult to understand and use*" (Rogers 1995: 242). It is analogous to the "ease of use" construct in the technology acceptance model (Davis 1989, Moore and Benbasat 1991).

As with relative advantage, the complexity or ease of use construct has been thoroughly supported as an important predictor of technology adoption in IS studies (Tornatzky and Klein 1982, Davis 1989, Davis et al. 1989, Moore and Benbasat 1991, Taylor and Todd 1995a) and in studies of consumer technology acceptance (Rogers 1983, Holak and Lehmann 1990, Taylor and Todd 1995b, Teo and Pok 2003, Choi et al. 2003). Generally, complexity is negatively related to attitude, suggesting that consumers prefer technologies that are easier to use (Teo and Pok 2003, Choi et al. 2003).

Compatibility

Compatibility is defined by Rogers (1995: 224) as the "degree to which an innovation is perceived as being consistent with the existing values, past experiences, and the current needs of potential adopters". As with relative advantage and complexity, the compatibility construct has been an important predictor of technology adoption in IS studies (Tornatzky and Klein 1982, Moore and Benbasat 1991, Taylor and Todd 1995a) and in studies of consumer technology acceptance (Rogers 1983, Holak and Lehmann 1990, Taylor and Todd 1995b, Teo and Pok 2003, Choi et al. 2003).

Rogers (1983, 1995) observes that exposure to, and experience with, related products may increase the perceived compatibility of an innovation to potential adopters. This suggests that previous adopters of a video game console will experience greater perceived compatibility with a newer video game console than non-adopters (Rogers 1983, 1995, Teo and Pok 2003). In addition, the innovation is more likely to be adopted if there is a direct and immediate need for the innovation's function (Rogers 1995). For example, the ability to play DVDs was seen as an attractive feature of the PlayStation 2, as it eliminated the need to purchase a separate DVD player. In addition, a console that facilitates backward compatibility with an older console will give the consumer access to a larger range of games, thereby increasing its perceived compatibility.

The availability of additional functionality may positively affect the purchase decision. Additional functionality, such as the Xbox's and PS2's ability to play DVDs, have proven highly appealing to consumers (Gallagher and Park 2002, Becker 2004). Other video game consoles with additional functionalities have not been so successful: the Phillips CD-i, which simultaneously served as a video game player, teaching tool, and music player, was not successful (Trachtenberg 1996). More recently, the Sony PSX, a multifunction device which combines a PS2 game player, a DVD burner and a personal video recorder (along with other entertainment functions) was met with little enthusiasm upon its introduction to Japan in late 2003 (Becker 2004). In both cases, the consoles were expensively priced at US$799 and US$1000, respectively. Thus, while some additional functions may be a motivating factor for consumers, they may not be as significant as other variables, such as cost (Gallagher and Park 2002, Becker 2004).

If a console has backward compatibility and can play games originally released for an older console, consumers will have access to a larger range of games and hence may find the console more appealing (Gallagher and Park 2002). Three video game consoles have used this feature to their advantage: the Coleco Vision, the Sega Genesis, and the Sony PlayStation 2 (Gallagher and Park 2002, Schilling 2003). The Xbox 360 also supports older Xbox titles. The PS2's backward compatibility with the original PlayStation meant that consumers had access to over 800 PlayStation titles, a factor which contributed to its phenomenal success (Schilling 2003).

Image

Rogers (1995) stated that the degree of relative advantage is often expressed in terms of economic profitability, social prestige, or other benefits. However, Tornatzky and Klein (1982) observed that, in some cases, the degree of social prestige may be so different to relative advantage as to be

considered a separate factor (e.g. Holloway 1977). For this reason, Moore and Benbasat (1991) developed a separate scale to measure this factor, entitled "image".

Image is defined as "*the degree to which use of an innovation is perceived to enhance one's image or status in one's social system*" (Moore and Benbasat 1991: 195). While the importance of image has had mixed results in the IS literature (Moore and Benbasat 1991, Agarwal and Prasad 1997, Karahanna et al. 1999) but has been found to be an important factor in studies on consumer technology acceptance (Ostlund 1974, McCracken 1988, Holak and Lehmann 1990, Sweeney and Soutar 2001, Teo and Pok 2003). As video game consoles are primarily an entertainment technology, they are more of a lifestyle product than a necessity (Teo and Pok 2003). Therefore the perceived amount of social prestige (i.e. image) a video game console conveys to a consumer may have a significant impact on their attitude towards adopting a video game console.

Enjoyment

Enjoyment can be defined as the degree to which the user considers the technology itself to be enjoyable (Sheth et al. 1991, Sweeney and Soutar 2001, Choi et al. 2003). Research on enjoyment related factors has seen some support in the IS literature (Davis et al. 1992, Chin and Gopal 1995, Choi et al. 2003). For example, Choi et al. (2003) found that enjoyment was the most important attitudinal factor affecting the adoption of interactive TV. Davis et al. (1992) found that perceived enjoyment has significant effects on intention; similarly Triandis (1971) proposed that affect (feelings of joy, pleasure, and disgust) may affect behaviour. As one of the main functions of a video game console is to provide entertainment, the enjoyment construct may be an important factor affecting attitude towards console adoption.

Software Piracy

The U.S. gaming industry, which earned US$6.9 billion in 2002, claims to have lost US$3.2 billion the same year due to video game piracy (Holloway 2003). This is a piracy rate of 46.4%, compared to the music industry's claimed 10% (Holloway 2003). In the current video game market, both the PS2 and Xbox can be modified to enable the user to circumvent anti-piracy protection and thus play pirated games or games from other encoding regions (Becker 2002, Kushner 2004). In an attempt to foil software pirates, the Gamecube uses a proprietary mini-disc that is difficult to pirate. However, the games can still be copied using an emulator, a piece of software that allows cartridge games to be played on a PC by mimicking the original console.

In the current video game market, the cost of two to three new games for a console is equal to the cost of the console itself (Schilling 2003). Consequently, the main outlay for the consumer lies in the cost of the games, not in the cost of the console (Gallagher and Park 2002, Shankar and Bayus 2003, Kartas and Goode, 2009). By copying games, a consumer can essentially eliminate the main console ownership expense.

Subjective Norm

Some TPB studies have supported the decomposition of normative belief structures (Grube et al. 1986, Burnkrant and Page 1988, Taylor and Todd 1995a, Karahanna et al. 1999) while others have not (Shimp and Kavas 1984, Oliver and Beardon 1985, Taylor and Todd 1995b). Taylor and Todd (1995b) observe that "*the importance of decomposing normative belief structures should be related to the possible divergence of opinion among the referent groups*" (Taylor and Todd 1995b:141). They suggest that normative belief structure should only be decomposed where the significant referents are significantly different. Accordingly, this study decomposes normative structure into two referent groups, friends and family, for the following reasons.

The opinions of friends and family have been found to be an important normative influence in the adoption of consumer products (Burnkrant and Cousineau 1975, Miniard and Cohen 1979, Childers and Rao 1992, Fisher and Price 1992) and technology (Choi et al. 2003). Each group may have differing views on the adoption of a video game console. For example, Rogers (1995) discusses how the success of the Nintendo Entertainment System, a video game console introduced in the U.S. in 1985, was partially due to children's enthusiasm for exchanging information about the system with their friends. In contrast, parents generally did not approve of their children "wasting their time" playing video games (Sheff 1999). In such a situation, the monolithic normative structure may show no influence on subjective norm or intention because the referent groups may cancel each other out.

Perceived Behavioural Control

Ajzen (1985, 1991) considered the perceived behavioural control construct as having two dimensions, which are concerned with the notions of self-efficacy and external constraints. The internal notion of individual self-efficacy (Bandura 1977) relates to an individual's perceived ability to perform a behaviour. This construct will not be included in the research model, as previous studies in IS have found that the self-efficacy construct is fully mediated by perceived ease of use (complexity).

Cost

Evidence from consumer technology adoption literature suggests that if a price must be paid to adopt a technology, the perception that the price is high will negatively affect a consumer's perceived behavioural control (Taylor and Todd 1995b, Sweeney and Soutar 2001, Choi et al. 2003). The importance of cost is salient in the case of expensive goods (Sahni 1994). For a younger consumer, with less disposable income, this factor is predicted to be a significant barrier towards a consumer's decision to purchase a video game console. The aspect of cost under study is that the initial price of adopting the technology will be high, and that it will soon decline. This aspect of cost has been validated as a control factor in previous studies on consumer adoption of technologies (Sweeney and Soutar 2001, Choi et al. 2003).

Consoles such as the Nintendo Entertainment System, Sega Genesis, Nintendo 64, Sony PlayStation and Microsoft Xbox, can partially attribute their success to their reduced console prices (Rigdon 1997, Gallagher and Park 2002, Schilling 2003, Alvisi et al. 2003). Other consoles, such as the Phillips CD-i, 3DO Interactive Multiplayer, and Sega Saturn, have been unsuccessful due to their high cost (Trachtenberg 1996, Herman 1997, Gallagher and Park 2002, Schilling 2003). Clements and Ohashi (2004) and Shankar and Bayus (2003), who studied the presence of network effects in the video game industry, also found that successful consoles were sold at penetration prices from their introduction. This pricing strategy was implemented in order to increase consumer adoption and hence the installed base of a console (Shankar and Bayus 2003) and to profit from royalties on software sales (Gallagher and Park 2002, Schilling 2003). Therefore, the cost of a console is expected to have a significant influence on the potential consumer.

Fear of Obsolescence

This construct relates to a consumer's concern that a technology they will purchase may become technologically obsolete within a short period of time (Choi et al. 2003, Teo and Pok 2003). Although it has not been thoroughly reviewed in IS literature, this construct has received support from consumer technology adoption literature (Bauer 1960, Sahni, 1994, Choi et al. 2003, Teo and Pok, 2003) as a barrier to adoption. Currently, a new generation of video game consoles emerges every four or five years (Gallagher and Park 2002). If a consumer fears that the technology of video game consoles is changing rapidly, their perceived behavioural control may be lower (Choi et al. 2003).

Critical Mass

Critical mass relates to the concept of network effects, which describes how the value of a product or service to a consumer varies with the number of users of that product or service (Truman et al. 2003, Shankar and Bayus 2003). A widely used example of network effects is the telephone system, in which the value of being part of the telephone network increases as the number of users increases. Similarly, critical mass was found to be a significant factor in explaining consumers' adoption of PC online gaming (Hsu and Lu 2004). A consumer's perception of how many people within their social networks own a particular console may influence their purchase decision, as owning the same console as their peers would facilitate the sharing of games and gaming experiences (Gallagher and Park 2002, Schilling 2003, Shankar and Bayus 2003, Clements and Ohashi 2004).

Behavioural Intention

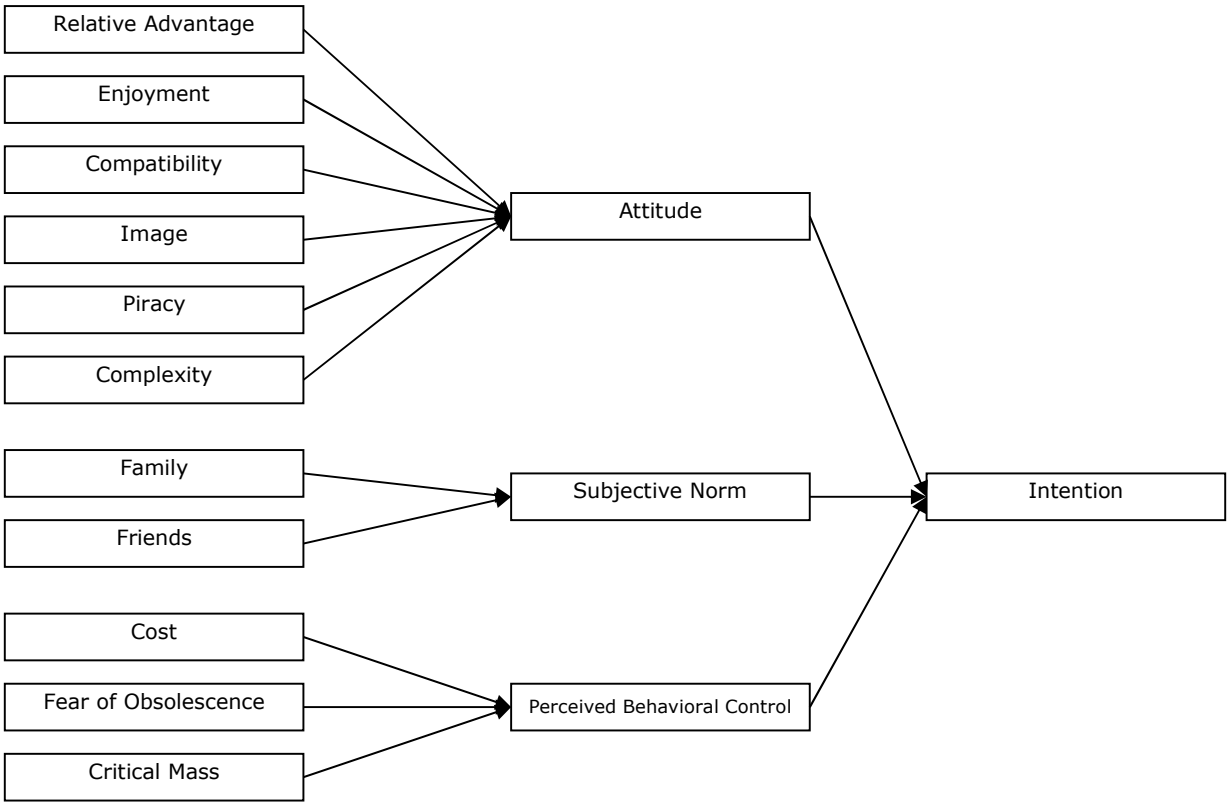
According to the theory of planned behaviour, there are three direct antecedents of intention: *attitude*, *subjective norm*, and *perceived behavioural control* (Ajzen 1985, 1991). *Attitude* refers to an individual's affective evaluation of a video game console. *Subjective norm* refers to the social influences that may affect an individual's adoption of a video game console. Finally, *perceived behavioural control* refers to the individual's belief that they have the necessary resources and opportunities to adopt a video game console. In the context of the theory of planned behaviour, intention to adopt is the dependent variable, while attitude, subjective norm and perceived behavioural control are the independents variables (Ajzen and Madden 1985, Ajzen 1985, 1991).

In accordance with the theory of planned behaviour literature (Ajzen, 1985, 1991, Ajzen and Madden 1985, Taylor and Todd 1995a, 1995b) the direct effects of attitude, subjective norm and perceived behavioural control will be tested with the hypotheses shown in Table 1.

Table 1. Research Constructs, Dimensions and Hypotheses

Construct	Dimension	Hypothesis
Attitudinal Structure	Relative Advantage	H_1: Relative advantage is positively associated with attitude.
	Enjoyment	H_2: Enjoyment is positively associated with attitude.
	Compatibility	H_3: Compatibility is positively associated with attitude.
	Image	H_4: Image is positively associated with attitude.
	Piracy	H_5: Software piracy is positively associated with attitude.
	Complexity	H_6: Complexity is negatively associated with attitude.
Normative Structure		H_7: Influences from family are positively associated with subjective norm.
		H_8: Influences from friends are positively associated with subjective norm.
Control Belief Structure	Cost	H_9: Cost is negatively associated with perceived behavioural control.
	Fear of Obsolescence	H_{10}: Fear of Obsolescence is negatively associated with perceived behavioural control.
	Critical Mass	H_{11}: Critical Mass is positively associated with perceived behavioural control.
Behavioural Intention		H_{12}: Attitude is positively associated with behavioural intention.
		H_{13}: Subjective norm is positively associated with behavioural intention.
		H_{14}: Perceived behavioural control is positively associated with behavioural intention.

Figure 1: The Research Model



Research Method Phase I – Exploratory Research

A preliminary, exploratory research phase was used to develop an adequate understanding of the problem area (Delbecq et al. 1975). The Nominal Group Technique is a technique for structuring small group meetings that allows a researcher to obtain individual judgements about a topic in a coherent listing of ideas (Moore 1987). It is commonly used in situations in which uncertainty exists about the scope and nature of a problem (Moore 1987).

The NGT is effective when used as a preliminary phase for the purpose of developing propositions which are tested or validated through survey instruments (Delbecq et al. 1975), as the comprehensive listing of ideas resulting from the NGT sessions may be relatively easily transformed into questionnaire items (Delbecq et al. 1975, Claxton et al. 1980). Additionally, the NGT has significant potential in the field of consumer research, particularly when attempting to identify

consumers' choice criteria of a product or service (Claxton et al. 1980). This makes the NGT ideal for studying the influences behind a consumer's decision to purchase a video game console.

Overview of the Nominal Group Technique Procedure

Sessions began with an opening statement which clarified member roles and group objectives, as suggested by Delbecq et al. (1975). This included a warm welcome, a statement of the importance of the task, mention of the importance of each member's contribution, and an indication of how the group's output would be used.

The procedure for the first stage of the NGT session involved the initial generation of ideas for the given topic question. The topic question for the NGT sessions was:

> *"What factors do you believe influence consumers to adopt a video game console? Conversely, what factors do you believe prevent consumers from adopting a video game console?"*

The group was presented with worksheets containing the topic question for the session. Participants were asked to independently and silently list their ideas in brief statements. The researcher avoided providing any detailed clarification of the research question, so as not to suggest or bias solutions.

The objective of the second stage was to map the group's ideas, by recording each idea on a whiteboard visible to the entire group. Going around the group, each participant was asked to give one idea at a time. If a participant had no further ideas, they were allowed to "pass" that round but could come back in another round if they wished. They were also encouraged to "hitchhike" ideas (for example, if a member's idea prompted another member to think of a new idea, they were encouraged to mention the idea in the next round). During this process, the researcher recorded the ideas in as close to the participant's own words as possible.

The objective of the third stage was to discuss and clarify each of the ideas given in the round-robin session. The discussion was paced in a way that avoided focusing on any particular idea for a lengthy period of time and also avoided the discussion degenerating into argument. At the end of the session, a final listing of ideas was transcribed by the researcher to build a list of factors.

Sampling Frame and Limitations

Delbecq et al. (1975: 113) state that "a valid assessment of a problem area can be accomplished by the involvement of different target groups. Therefore in order to gain a comprehensive understanding of the topic under research, several NGT sessions were conducted using target

groups from different perspectives. Groups differed in respect to age, gender, and adoption of video game consoles. An adopter was defined as owning at least one of the three 128-bit video game consoles still on the market: a Sony PlayStation 2, Microsoft Xbox, or Nintendo GameCube.

The sample for this phase comprised Honours and undergraduate students at the ANU. This choice of sample was limited in terms of participant age variance. However, this was deemed unavoidable as "*a stimulating discussion is not enough to induce most individuals into spending time in [an NGT session]… most participants are provided monetary and other incentives*" (Stewart and Shamdasani 1990: 55). Due to a lack of research funds, monetary compensation for participants was not a viable option.

Four NGT sessions were conducted. Two groups consisted of adopters of a 128-bit video game console, with one group comprised of males and the other of females. Similarly, the other two groups consisted of participants who had *not* adopted a video game console, with one group comprised of males and the other of females. All participants were between 19-23 years of age. Each session comprised five participants, the minimum number suggested by Delbecq et al. (1975).

Results of the NGT Sessions

As in Claxton et al. (1980), the first step in obtaining a comprehensive analysis of these problem statements was to identify themes common across all NGT sessions. This was achieved by preparing individual cards for each problem statement. All statements from all sessions were then categorised into different groups. Statements containing essentially the same words or ideas were grouped into problem categories or 'themes'. The themes were then further aggregated to determine major problem dimensions (Claxton et al. 1980). Table 2 lists the themes and their dimensions.

As seen in Table 2, the dimensions identified in the NGT sessions corresponded well to the constructs listed in the research model. The *technological factors* and *availability of compelling software* dimensions are classified under relative advantage. The *social influence* dimension identified the referent groups of family and friends, corresponding to the subjective norm construct in the research model. Although *image* was not mentioned in the sessions, it was included in the model based on its prior validation in the consumer technology acceptance literature.

Table 2. Results of the Nominal Group Technique Sessions

Dimension	Theme
Enjoyment	Whether the intended user enjoys playing video games
Social Influences	Friends' thoughts about the purchase of a video game console
	Family's thoughts about the purchase of a video game console
Critical Mass	Whether other users owned the same video game console
Technological Factors	Graphics quality
	Processor speed
Availability of Compelling Software	Variety of game titles for the system
	"Killer applications" - games so good that they are worth buying the console for
	The type of games available for the console that appeal to a particular consumer's tastes
Complexity	How easy it is to run the console
	How easy it is to use the controller
Software Piracy	Saving money through pirating games for a console
	Pirating games is morally wrong
Extra features	Whether the console has a DVD player
	Whether the console plays audio CDs
	Whether the video game console facilitates online game play
	Whether the video game console plays games for an older console (backward compatibility)
	Whether the video game console has any other appealing features
Fear of Obsolescence	Fear that the console will have to be replaced in a short period of time
	Belief that a better console will emerge in a short period of time
Cost	Cost of the video game console
	Belief that the cost of a console will decrease in the future

Research Method Phase II – Confirmatory Research

A survey was chosen as the most suitable method for the second phase of the research. Survey research facilitates testing a large number of factors in a research model (Weisberg and Bowen 1977). Further, the results of survey research can be generalised to a larger population (Salkind 2003), and can be relatively inexpensive and less time consuming to administer than other methods, such as interviews or experiments (Salkind 2003). Many studies involving the original and decomposed theories of planned behaviour use survey methods to test their models (Ajzen 1991, Taylor and Todd 1995b, Choi et al. 2003, Teo and Pok 2003).

Instrument Development

Straub (1989) emphasised the importance of valid research instruments in IS. Better instrument validation can improve research rigor and promote cooperative research efforts by permitting confirmatory, follow-up research using a tested instrument. In the interest of instrument validity, this study used the instrument development process used in Moore and Benbasat (1991).

Item Creation

The first stage, item creation, involved identifying pools of items for each construct, and creating additional items that appear to fit the definition of the construct (Moore and Benbasat 1991).

Accordingly, the literature was reviewed in the areas of IS, consumer technology acceptance, and the video game market for items to represent each construct. Some constructs, such as *software piracy*, could not be found in the literature and new items were developed. Table 3 details the research constructs and their corresponding question items.

Table 3. Constructs and Corresponding Survey Instrument Items

Construct	Citation	Indicator
Behavioural Intention	Taylor and Todd (1995b)	"I intend to buy a newer video game console within 6 months of their release" "I plan to use a newer video game console to play video games"
Attitude	Ajzen (1985), Taylor and Todd (1995)	"Buying a newer video game console would be a wise idea" "I like the idea of using a newer video game console" "Using a newer video game console is a bad idea" "Buying a newer video game console is a wise idea"
Subjective Norm	Taylor and Todd (1995b)	"Most people who are important to me would think that I should (buy/use) a newer video game console" "Most people who influence my decisions would think that I should (buy/use) a newer video game console"
Perceived Behavioural Control	Ajzen (1985), Taylor and Todd (1995b)	"I have the resources, knowledge and ability to buy a newer video game console" "I have the resources, knowledge and ability to use a newer video game console"
Relative Advantage	Taylor and Todd (1995b)	"A newer video game console will not offer me any new benefits over an older video game console" "The advantages of a newer video game console outweigh the disadvantages" "A newer video game console will be technologically superior to an older video game console" "The games for a newer video game console will be more entertaining than the games for an older video game console"
Complexity	Taylor and Todd (1995b)	"A newer video game console will be easier to operate" "A newer video game console will be frustrating to learn" "A newer video game console will be difficult to learn"
Compatibility	Taylor and Todd (1995b)	"A newer video game console is completely compatible with my current situation" "A newer video game console would fit well with my lifestyle"
Image	Moore and Benbasat (1991), Choi et al. (2003), Teo and Pok (2003)	"A newer video game console is a status symbol" "Owning a newer video game console will enhance my social status" "Owning a newer video game console will give me more privileges than people who own an older video game console"
Enjoyment	Davis et al. (1992), Choi et al. (2003)	"I would have fun using a newer video game console" "Using a newer video game console would be pleasant" "I would find using a newer video game console enjoyable"
Software Piracy	Ajzen (1985, 1991)	"Being able to copy games for a newer video game console is good" "Given the opportunity, I would copy games for a newer video game console"
Family	Taylor and Todd (1995b)	"My family would think that I should buy a newer video game console" "My family would think that I should use a newer video game console"
Friends	Taylor and Todd (1995b)	"My friends would think that I should buy a newer video game console" "My friends would think that I should use a newer video game console"
Cost	Choi et al. (2003)	"I would delay purchasing a newer video game console until the price becomes lower" "I would not want to purchase a newer video game console because the price of the console would be too high" "I would not want to purchase a newer video game console because the price of the games will be too high"
Fear of Obsolescence	Teo and Pok (2003), Choi et al. (2003)	"If I buy a newer video game console, a new model will appear soon after" "A newer video game console will soon become obsolete"
Critical Mass	Shankar and Bayus (2003)	"I would want to buy the video game console that most of my friends own in order to share games and experiences with them" "Being able to share video games with my friends is good"

Instrument Pre-Testing

The pre-test involved a convenience sample of eight graduate students. A brief definition of each construct was given to participants, who were asked to comment on whether the items accurately

describe their associated constructs, as well as the format and wording of the items. Minor revisions to the format and wording of some questions were made.

A pilot test of the instrument was then conducted. The questionnaire was given to 15 graduate and undergraduate students, who were asked to complete the questionnaire and comment on length, format and wording. Minor revisions of item wording and questionnaire layout were made.

Population and Sample Frame

The chosen sample for this phase of the study comprised graduate and undergraduate students at the university. This sample fitted the requirements of an 18-35 age distribution, with an approximately equal gender distribution.

There were two possible limitations to this sample. One was that the sample might not be completely representative of the video gamer population with respect to age, but resource constraints made this difficult to avoid. The other limitation was that the income of the sample was not predicted to vary significantly, as the average income of a university student is generally quite low. However, a value for the average income of the video game population could not be found in the literature, making comparison difficult.

Results and Analysis

A total of 210 surveys were distributed to students at the university. Of these, 144 were deemed suitable for further analysis. Table 4 lists the questionnaire response rate.

Table 4. Questionnaire Responses

	No.	%
Questionnaires distributed	210	100
Questionnaires with no missing values	132	62.9
Questionnaires with missing values		
Less than 15% missing values	12	5.7
Greater than 15% missing values	28	13.3
Questionnaires declined	38	18.1
Total usable questionnaires	144	68.6

Some 40 returned questionnaires had missing responses to questionnaire items. Following advice from McDermeit et al. (1999), the 28 questionnaires in which more than 15% of items were unanswered were excluded from the analysis.

Respondent Demographics

Table 5 shows the demographics for usable surveys. The gender distribution is even, meaning that a gender comparison of intentions is appropriate. The age of the sample exhibits low variance, and the general income of the sample is low.

Table 5. Respondent Demographic Profile

		No.	%
Gender	Male	72	50
	Female	72	50
Age	17-20	87	60.4
	21-24	51	35.4
	25-28	6	4.2
Annual Income	Less than $2,500	70	48.6
	$2,500 - $9,999	35	24.3
	$10,000 - $19,999	28	19.5
	$20,000 - $29,999	7	4.8
	More than $30,000	4	2.8

Method of Data Analysis

Correlation testing was used to analyse the survey data, based on its usefulness in assessing the strength of relationships between direct and indirect antecedents in the research model (Salkind 2003). In order to test sample normality and hence gauge the suitability of parametric or non-parametric methods, a histogram of age was conducted. The histograms revealed that the sample's age distribution was left-skewed and consequently not normal, suggesting the use of non-parametric methods would be appropriate (Iman and Conover 1983). The non-parametric Spearman's Rho test was used for data analysis. Three analyses were performed. The first involved analysis of the entire general sample. The second was a within-subjects comparison of adopters and non-adopters of a video game console and the third was a within-subjects comparison of gender and adoption.

Analysis of the General Sample

As seen in Table 6, all the hypotheses relating to attitudinal structure (H_1, H_2, H_3, H_4, H_5 and H_6) were supported, with *enjoyment* ($\varrho = 0.622$, $p < 0.01$) and *relative advantage* ($\varrho = 0.577$, $p < 0.01$) having the highest correlations with attitude. With regard to normative influences, the influence of *family* ($\varrho = 0.690$, $p < 0.01$) and *friends* ($\varrho = 0.723$, $p < 0.01$) both correlated highly with *subjective norm*, supporting H_7 and H_8. *Critical mass* was the only underlying construct that significantly correlated with *perceived behavioural control* ($\varrho = 0.373$, $p < 0.01$), supporting H_{11}. Both *cost* and *fear of obsolescence* were found to have insignificant correlations with perceived behavioural control. Finally, while

attitude ($\varrho = 0.509$, $p < 0.01$) and *subjective norm* ($\varrho = 0.669$, $p < 0.01$) significantly correlated with behavioural intention to adopt a video game console, *perceived behavioural control* did not.

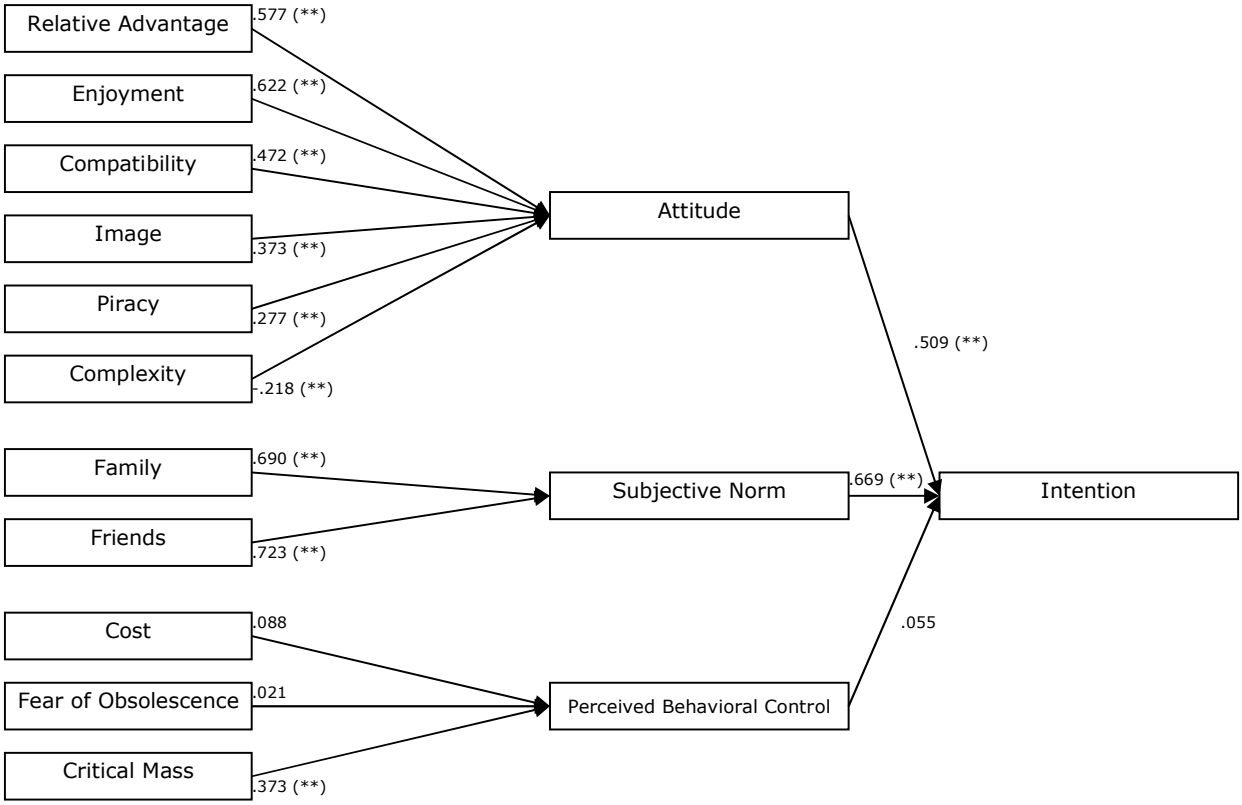
Table 6: Correlations for the Entire Sample

Hypothesis	Path	Correlation Coefficient	Supported	n
H_1	RA → ATT	0.577	Yes (**)	144
H_2	ENJ → ATT	0.622	Yes (**)	144
H_3	COMPAT → ATT	0.472	Yes (**)	144
H_4	IMAGE → ATT	0.373	Yes (**)	144
H_5	PIRACY → ATT	0.277	Yes (**)	144
H_6	COMPLEX → ATT	-0.218	Yes (**)	144
H_7	FAMILY → SN	0.690	Yes (**)	144
H_8	FRIENDS → SN	0.723	Yes (**)	144
H_9	COST → PBC	0.088	No	144
H_{10}	RISK → PBC	0.021	No	144
H_{11}	CMASS → PBC	0.373	Yes (**)	144
H_{12}	ATT → INT	0.509	Yes (**)	144
H_{13}	SN → INT	0.669	Yes (**)	144
H_{14}	PBC → INT	0.055	No	144

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

Figure 2. Research Model with Correlation Coefficients (n=144)



** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

Comparison of Adopter and Non-adopter Respondents

As seen in Table 7, there were two key differences between the adopter and non-adopter groups. First, while *software piracy* significantly correlated with adopters ($\varrho = 0.365$, $p < 0.05$), it did not for non-adopters. Second, *image*, while correlating significantly with non-adopters ($\varrho = 0.462$, $p < 0.05$), did not correlate significantly for adopters.

Table 7. Correlations for Adopters and Non-Adopters

		Adopters			Non-Adopters		
Hypothesis	Path	Correlation Coefficient	Supported	n	Correlation Coefficient	Supported	n
H_1	RA → ATT	0.585	Yes (**)	52	0.491	Yes (**)	92
H_2	ENJ → ATT	0.667	Yes (**)	52	0.584	Yes (**)	92
H_3	COMPAT → ATT	0.364	Yes (**)	52	0.533	Yes (**)	92
H_4	IMAGE → ATT	0.199	No	52	0.462	Yes (**)	92
H_5	PIRACY → ATT	0.365	Yes (**)	52	0.104	No	92
H_6	COMPLEX → ATT	-0.325	Yes (**)	52	-0.207	Yes (**)	92
H_7	FAMILY → SN	0.615	Yes (**)	52	0.724	Yes (**)	92
H_8	FRIENDS → SN	0.708	Yes (**)	52	0.728	Yes (**)	92
H_9	COST → PBC	0.045	No	52	0.064	No	92
H_{10}	RISK → PBC	0.039	No	52	0.005	No	92
H_{11}	CMASS → PBC	0.359	Yes (**)	52	0.337	Yes (**)	92
H_{12}	ATT → INT	0.510	Yes (**)	52	0.605	Yes (**)	92
H_{13}	SN → INT	0.627	Yes (**)	52	0.684	Yes (**)	92
H_{14}	PBC → INT	-0.066	No	52	0.128	No	92

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

Comparison of Gender Response

The results of the gender analyses, shown in Table 8, were similar to the results of the general sample. Interestingly, *critical mass* was more strongly related to *perceived behavioural* control for males ($\varrho = 0.499$, $p < 0.01$) than for females, for whom there was no significant correlation. Thus, while H_{11} was supported for males, it was not for females.

Table 8. Correlations for Males and Females

		Male			Female		
Hypothesis	Path	Correlation Coefficient	Supported	n	Correlation Coefficient	Supported	n
H_1	RA → ATT	0.556	Yes (**)	72	0.575	Yes (**)	72
H_2	ENJ → ATT	0.678	Yes (**)	72	0.575	Yes (**)	72
H_3	COMPAT → ATT	0.612	Yes (**)	72	0.256	Yes (**)	72
H_4	IMAGE → ATT	0.452	Yes (**)	72	0.374	Yes (**)	72
H_5	PIRACY → ATT	0.256	Yes (*)	72	0.286	Yes (*)	72
H_6	COMPLEX → ATT	-0.242	Yes (**)	72	-0.309	Yes (**)	72
H_7	FAMILY → SN	0.657	Yes (**)	72	0.753	Yes (**)	72
H_8	FRIENDS → SN	0.691	Yes (**)	72	0.751	Yes (**)	72
H_9	COST → PBC	-0.062	No	72	-0.023	No	72
H_{10}	RISK → PBC	0.022	No	72	-0.033	No	72
H_{11}	CMASS → PBC	0.499	Yes (**)	72	0.060	No	72
H_{12}	ATT → INT	0.489	Yes (**)	72	0.512	Yes (**)	72
H_{13}	SN → INT	0.669	Yes (**)	72	0.649	Yes (**)	72
H_{14}	PBC → INT	-0.031	No	72	0.099	No	72

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

Discussion and Conclusions

The results indicate that the intention to adopt a video game console is associated with attitudinal factors and normative factors, but not control factors. In previous technology adoption studies, *attitude* and *subjective norm* have been found to be important determinants of behavioural intention, both in organisational environments (Davis et al. 1989, Mathieson 1991, Taylor and Todd 1995a) and in consumer adoption (Taylor and Todd 1995b, Choi et al. 2003, Teo and Pok 2003). While *perceived behavioural control* has been a significant factor in some technology adoption studies (Mathieson 1991, Taylor and Todd 1995a, Choi et al. 2003) it was not significant in two studies which applied a decomposed theory of planned behaviour to consumer technology adoption (Taylor and Todd 1995b, Teo and Pok 2003). In their study of WAP-enabled mobile phone adoption, Teo and Pok (2003) speculated that perceived behavioural control was not significant because users may consider adoption to be a personal or trivial matter that is within their control. Taylor and Todd (1995b) and Ajzen and Madden (1985) also contended that if perceived behavioural control was unusually high, it was less likely to be related to intention. Respondents in this study reported rather high levels of behavioural control (mean = 4.77) with relatively low variability ($\sigma = 0.97$). This could explain the insignificant relationship between *perceived behavioural control* and *intention*.

All of the underlying belief structures of attitude (relative advantage, complexity, compatibility and image) correlated significantly with *attitude*, consistent with previous studies (Rogers 1983, 1995, Moore and Benbasat 1991, Taylor and Todd 1995a, 1995b, Choi et al. 2003, Teo and Pok 2003). The *enjoyment* construct had the highest correlation with *attitude*, consistent with Choi et al. (2003). However, the importance of enjoyment may be overestimated when studying the adoption of a technology designed for purely entertainment purposes. As Choi et al. (2003: 180) note, "enjoyment could turn out to be irrelevant if the target of the study were an interactive refrigerator instead of an interactive TV". Further research is required to determine the importance of enjoyment in the adoption of information systems.

The influence of both friends and family were found to have a high correlation with subjective norm, and, similarly, subjective norm had the highest correlation with intention. Consequently, a consumer's behavioural intention to purchase a video game console could be mainly affected by the opinions of their family and friends, consistent with Taylor and Todd (1995b) and Choi et al. (2003).

These findings suggest that, because a video game console could be shared by the family, family opinions on the product might greatly influence the consumer. However, the family may have a negative effect depending on age, for example if parents do not approve of their younger children playing video games (Sheff 1999).

Neither *cost* nor f*ear of obsolescence* of a video game console were found to be significantly correlated to *perceived behavioural control*, contrary to previous research in the consumer technology acceptance literature (see Sweeney and Soutar 2001, Choi et al. 2003, Teo and Pok 2003). Teo and Pok (2003) noted that PCs and mobile phones, respectively, were rapidly changing technologies. Similarly, Choi et al. (2003) noted that, from a consumer's perspective, interactive TV was unproven and it was thus difficult to predict how the technology would change. In contrast, successful video game consoles have usually demonstrated a life span of four or more years (Gallagher and Park 2002, Schilling 2003). As a result, a consumer may believe that the technology will not be made obsolete for some time and, consequently, they will be able to spread the ownership costs over time.

The *software piracy* construct may be an underlying factor of *attitude* rather than *perceived behavioural control* ($\rho = 0.277$, $p < 0.05$). Further, the construct appeared important for adopters but not non-adopters. Both males and females were significantly associated with this construct.

With regard to adopters and non-adopters, *image* correlated significantly with *attitude* for non-adopters, but not for adopters. This suggests that non-adopters may find the social status conferred by adopting a video game console is important, whereas previous adopters do not, consistent with prior consumer technology adoption literature (Holak and Lehmann 1990, Teo and Pok 2003). The results suggest that previous experience with a video game console may weaken the perceived social status conferred by a newer video game console. Rogers (1995) states that adopters may be reluctant to admit that they were motivated to adopt merely in order to secure the status aspects associated with that innovation. This reluctance may have been reflected by the previous adopters of a video game console if they associated image with their previous purchases. Direct questioning of this construct may have underestimated its importance in the adoption decision (Rogers 1983, 1995).

The only major difference found between genders was that *critical mass* did not significantly correlate with *perceived behavioural control* for females. The 'young male' stereotype (Adams 2003, King and Borland 2003) may have been perpetuated to the point that females do not believe that their female friends would own or be interested in video game consoles. Further research of the female

perception of critical mass as it relates to gender differences is required to understand video game console adoption in greater depth.

The findings of this study may be open to some limitations. First, the generalisability of the findings to other populations is uncertain, as the sample may not be representative of the video gamer population with respect to age. The age of the sample ranged from 17 – 28 years old, which did not take children or older console adopters into account. Survey respondents may have felt apprehensive about answering self-reported measures of behaviour in which they perceive there is a "correct" response. This could result in participants attempting to depict themselves in a more favourable light, rather than answering the questions according to their own beliefs.

While a large amount of questionnaires were handed out during testing, there was a high rate of unusable or declined responses. In addition, some measures demonstrated rather low reliability scores during pilot testing. While they were considered acceptable for the purposes of this research (Nunnally 1967) other studies have used a higher minimum level of reliability (e.g. Moore and Benbasat 1991).

This study raises a number of important implications. This study developed a decomposed model of the theory of planned behaviour to explain the adoption of video game consoles. Normative influences, in particular, emerged as a primary influence into the consumer's console adoption decision, supporting Rogers' (1995) and Choi et al's (2003) assessment that at the early stages of an innovation's introduction, social influences are the dominant influence on adoption intentions. In addition, past adopters of a video game console had decreased perceptions of the social status conferred by future upgrades.

This study demonstrated several practical implications for both the video game industry and regulatory bodies. First, there was evidence to show that consumers would be highly influenced by their friends' and family's opinions of a video game console before the purchase. Accordingly, measures could be taken to increase the opinions of these referent groups. Strategies such as increased advertising and marketing of video game consoles aimed at promoting their use for the entire family unit could be valuable.

In addition, subjects that had favourable views of video game console adoption also demonstrated some sympathy toward video game piracy. This study tested whether a willingness to engage in video game piracy was related to a consumer's attitude towards a video game console, which is only

one aspect of this topic. More research is required to determine consumer's moral evaluations and content ownership decisions of video game consoles.

Finally, the results showed that females may not see the advantages of purchasing the same video game console as their friends. Console manufacturers could consider fostering a similar sense of community with female video gamers in order to cater to this rapidly expanding market.

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